IN THE UNITED STATES
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Patent Application

Inventor(s)	Boris Dmitrievich Lubachevsky Alan Weiss	Case Name	Lubachevsky 10-2
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Examiner	Thomas H. Stevens	Group Art Unit	2123
Title	Discrete Event Parallel Simulation		

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SIR:

AFFIDAVIT UNDER 37 CFR 1.132

1. My name is Matthew Andrews
2. I received a PhD in Theoretical Computer Science from MIT in 1997. I am currently a member of technical staff in the Mathematics of Networks and Systems Department at Bell Labs in Murray Hill, NJ. Much of my work involves performing simulations of communication networks. I am familiar with the theory of optimistic parallel simulation.
3. Mr. Brendzel, who represented that he is the attorney of record in the above-identified patent application, requested that I read a 1993 article by Eick et al., titled "Synchronous Relaxation for Parallel Simulations with Applications to Circuit-Switched Networks" (henceforth, the "reference.")
4. Mr. Brendzel also requested that I read the above-identified patent application.
5. The reference teaches a method where a plurality of PEs are arranged to work in parallel. The tasks assigned to the PEs are the simulation of events in its pre-assigned subsystem, in steps of predefined time slices.
6. During each iteration a PE constructs the sequence of events of its subsystem during the interval (i-1)D and iD.
7. Clearly, therefore, the reference teaches a time-interval-based system.
8. There is no definitive language that specifies the duration of that interval (D), other than it can be chosen to be "on the order of" M/logM, where M is the number of PEs used.
9. I note that, universally, a term like "log M" implies that the logarithm is taken to the base *e*, where *e* is the base to the natural system of logarithms, having a numerical value of approximately 2.71828.

10. That means that the chosen time interval is increased with increases in the number of PEs used, but not quite linearly.
11. The reference also teaches a variation of the time slice approach, where a combination of time and number of elements is employed. Specifically, an interval (step size D) is chosen, but at each iteration "at most B" events belonging to the system are simulated. If during the time interval there are fewer than B events, the simulations proceeds to completion with that smaller number of events being simulated, and at the end of each iteration all or almost all of the PE's are at a common point in time. Only those PE's that experience more than B events in the operating time interval end up at a different points in time.
12. To summarize,

    (a) the specification of tasks for the PEs is in terms of a time interval, and not in terms of number of events.

    (b) At those different time intervals D, the PEs may be called upon to compute different numbers of events.

    (c) Other than in situations of the variation mentioned in point 11 above, at the end of each step, all of the PEs are at a known time instant (iD).

    (d) Even in situations of the variation mentioned in point 11 above, the method aims to have all PEs at the aforementioned time instant, and only those PEs that have more than B number of events will be at some other instant.

    (e) In any event, the method described in the reference operates primarily with time intervals as the demarcation points between computation steps, rather than number of evens as demarcation points between computation steps.
13. Additionally, I note that the reference addresses events without distinction between events that have no effect on adjacent subsystems (which are handled by other PEs) and events that do have an effect on adjacent systems. The latter type of events are called edge events.
14. I further note that, in contradistinction, the above-identified application focuses on edge events as to the number of events that are to be handled in each step of the PE's operation.
15. A method that focuses on or is based on edge events is, of course, quite different from a method that does not, and a method that specifies PE steps in terms of (a) events which (b) are edge events, is totally different from a method that focuses on events that occur within a specified time interval.
16. I note still further that the above-identified application chooses the steps to contain a number of edge events that is approximately equal to $e \log_e N$, where N is the number of PEs.
17. Aside from the issue that the number N relates to edge events rather than to all events, it is noted that the number N grows much more slowly than in the reference. Whereas in the reference the number of events grows almost linearly (see point 10 above), in the above-identified application that number grows logarithmically.

18. Based on the above, it is my professional conclusion that the reference does not teach controlling a step size based on events only, does not teach controlling a step size based on edge events, and does not teach controlling a step size logarithmically with the number of available PEs.

Matthew Andrews

March 30, 2005